YAYUAN LIU

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Assistant Professor (Jan. 2022 – present)
Department of Chemical and Biomolecular Engineering, Johns Hopkins University

Education and Training

Massachusetts Institute of Technology, Cambridge, MA 2019-2021
Postdoctoral Associate, Department of Chemical Engineering
Advisor: T. Alan Hatton

Stanford University, Stanford, CA 2019
Ph.D. Materials Science and Engineering
Advisor: Yi Cui

Nanyang Technological University, Singapore 2014
B.Eng. Materials Science and Engineering

Selected Awards and Honors

Beckman Young Investigator Award	2023
NSF CAREER Award	2023
Clarivate list of High Cited Researchers	2022
Electrochemical Society Toyota Young Investigator Award	2022
American Chemical Society Petroleum Research Fund Doctoral New Investigator award	2022
Scialog Fellow on Negative Emissions Science	2021, 2022
Forbes 30 under 30 Honoree, Science	2021
American Chemical Society Division of Inorganic Chemistry Young Investigator Award	2019
Materials Research Society Graduate Student Gold Award	2018
Stanford Graduate Fellowship	2017-2019
Stanford University O. Cutler Shepard Award	2017
Nanyang Technological University Lee Kuan Yew Gold Medal	2014
Nanyang Technological University Chen-Ning Yang Scholarship	2010-2014

Selected Publications (corresponding and first author)

‡ Denotes equal contribution ***** Denotes corresponding author
Total publications: 80 Total citations: 25,000+ H-index: 60

22. **Y. Liu*** et al. Breaking the Hammett law in redox-tunable Lewis bases for electrochemically mediated carbon capture. *Under Review*
21. **Y. Liu*** et al. Assessing the kinetics of electrochemically mediated carbon capture. *Under Review*
20. **Y. Liu*** et al. Electrochemically responsive materials for energy-efficient water treatment and carbon capture. ***Applied Physics Review*** *In Press*
19. Redox-tunable Lewis bases for electrochemical carbon dioxide separation. X. Li, X. Zhao, Y. Liu*, T. A. Hatton*, **Y. Liu*** ***Nature Energy*** 7, 1065–1075 (2022).
18. Challenges and opportunities in continuous flow processes for electrochemically mediated carbon capture. **Y. Liu***, É. Lucas, I. Sullivan, X. Li, C. Xiang, ***iScience*** 10, 105153 (2022).
17. Towards solvent-free continuous-flow electrochemically mediated carbon capture with high concentration liquid quinone chemistry. **Y. Liu***‡, K. M. Diederichsen‡, N. Ozbek, H. Seo, T. A. Hatton* ***Joule*** 6, 221–239 (2022).
16. Electrochemically-mediated gating membrane with dynamically-controllable gas transport. **Y. Liu**, C.-M. Chow, K. R. Phillips, M. Wang, S. Voskian, T. A. Hatton* ***Science Advances*** 6, eabc1741(2020).
15. Electrochemically-mediated carbon dioxide separation with quinone chemistry in salt-concentrated aqueous media. **Y. Liu**, H.-Z. Ye, K. M. Diederichsen, T. Van Voorhis, T. A. Hatton* ***Nature Communications*** 11, 2278 (2020).

14. Challenges and opportunities towards fast charging battery materials.
Y. Liu, Y. Zhu, Y. Cui* ***Nature Energy*** 4, 540–550 (2019).
13. Fast galvanic lithium corrosion involving a Kirkendall-type mechanism.
D. Lin‡, **Y. Liu**‡, Y. Li, Y. Li, A. Pei, J. Xie, W. Huang, Y. Cui* ***Nature Chemistry*** 11, 382–389 (2019).
12. Solubility-mediated sustained release enabling nitrate additive in carbonate electrolytes for stable lithium metal anode. **Y. Liu**, D. Lin, Y. Li, G. Chen, A. Pei, O. Nix, Y. Li, Y. Cui*
Nature Communications 9, 3656 (2018).
11. An ultrastrong double-layer nanodiamond interface for stable lithium metal anodes.
Y. Liu‡, Y. -K. Tzeng‡, D. Lin, A. Pei, H. Lu, N. A. Melosh, Z. -X. Shen, S. Chu*, Y. Cui*
Joule 2, 1595–1609 (2018).
10. Design of complex nanomaterials for energy storage: past success and future opportunity.
Y. Liu, G. Zhou, K. Liu, Y. Cui* ***Accounts of Chemical Research*** 50, 2895–2905 (2017).
9. Transforming from planar to three-dimensional lithium with flowable interphase for solid lithium metal batteries.
Y. Liu, D. Lin, Y. Jin, K. Liu, X. Tao, Q. Zhang, X. Zhang, Y. Cui*
Science Advances 3, eaao0713 (2017).
8. Reviving the lithium metal anode for high-energy batteries.
D. Lin‡, **Y. Liu**‡, Y. Cui* ***Nature Nanotechnology*** 12, 194–206 (2017).
7. An artificial solid electrolyte interphase with high Li-ion conductivity, mechanical strength, and flexibility for stable lithium metal anodes. **Y. Liu**, D. Lin, P. Y. Yuen, K. Liu, J. Xie, R. H. Dauskardt, Y. Cui*
Advanced Materials 29, 1605531 (2017).
6. A Prussian blue route to nitrogen-doped graphene aerogels as efficient electrocatalysts for oxygen reduction with enhanced active site accessibility. **Y. Liu**, H. Wang, D. Lin, J. Zhao, C. Liu, J. Xie, Y. Cui*
Nano Research 10, 1213–1222 (2017).
5. Layered reduced graphene oxide with nanoscale interlayer gaps as a stable host for lithium metal anodes.
D. Lin‡, **Y. Liu**‡, Z. Liang, H. W. Lee, J. Sun, H. Wang, K. Yan, J. Xie, Y. Cui*
Nature Nanotechnology 11, 626–632 (2016).
4. Lithium-coated polymeric matrix as a minimum volume-change and dendrite-free lithium metal anode.
Y. Liu‡, D. Lin‡, Z. Liang, J. Zhao, K. Yan, Y. Cui* ***Nature Communications*** 7, 10992 (2016).
3. Electrochemical tuning of olivine-type lithium transition-metal phosphates as efficient water oxidation catalysts.
Y. Liu, H. Wang, D. Lin, C. Liu, P. C. Hsu, W. Liu, W. Chen, Y. Cui*
Energy & Environmental Science 8, 1719–1724 (2015).
2. Dual-phase spinel $MnCo_2O_4$ and spinel $MnCo_2O_4$/nanocarbon hybrids for electrocatalytic oxygen reduction and evolution. X. Ge‡, **Y. Liu**‡, F. T. Goh, T. A. Hor*, Y. Zong, P. Xiao, Z. Zhang, S. H. Lim, B. Li, X. Wang, Z. Liu* ***ACS Applied Materials & Interfaces*** 6, 12684–12691 (2014).
1. Designable yolk-shell nanoparticle@MOF petalous heterostructures.
Y. Liu, W. Zhang, S. Li, C. Cui, J. Wu, H. Chen, F. Huo* ***Chemistry of Materials*** 26, 1119–1125 (2014).

Patents

1. Composite lithium metal anodes for lithium batteries with reduced volumetric fluctuation during cycling and dendrite suppression. US Patent 15/348,884.
2. Solid-state lithium metal battery based on three-dimensional electrode design. US Patent App. 16/616,910.
3. Porous medium with adjustable fluid permeability and associated systems and methods. US Provisional App. 63/002,490.

Professional Services

Associate Editor, Materials Today Energy (Elsevier)

Chair, Gordon Research Seminar on Chemical Separations 2022

Symposium Organizer, "The Role of Fundamental Interfacial Processes in Electrocatalysis" ACS Spring 2022

Committee on Diversity and Inclusion, 2022-present
Department of Chemical and Biomolecular Engineering, Johns Hopkins University